THE VALUE

OF

GOOD FOOD.

No. 3 of Deposits in the Savings' Bank of Wisdom, made in behalf of Working Men and Women.

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THE VALUE OF GOOD FOOD.

It so happens that one of my friends has a powerful steam-engine, which he keeps employed in spinning wool into yarn. It is a great enjoyment to me to stand and watch that iron giant performing his ingenious work. I delight to see his massive arms swinging up and down with mighty strength, and his huge wheels and heavy shafts rolling round with resistless power. In one place he may be contemplated washing bales of wool with his iron hands, and picking them into shreds. In another, vast revolving drums collect the cleansed shreds, and press them dry. Then steel fingers draw them through fine-toothed combs, and distribute them into threads, which are next pulled out more and more slenderly between quickly-turning rollers. Lastly, the threads are delicately twisted and wound upon ten thousand spindles. The giant strength of the great central shaft is thus expended upon a countless multitude of pigmy, spider-like efforts. Each of those spindles turns with a force such as an infant's finger could communicate. But the thousands of softly-twirling spindles require, nevertheless, the might of a hundred horses to keep them all at their work.

Where do you think that yarn-spinning giant gets all his wonderful hundred-horse power? Whence do you suppose he derives the strength, which can make those iron hands and steel fingers continually clutch at the wool-bales, and those ten thousand spindles turn unceasingly from morning till night? You will say he gets it *from steam;* he is a steam-giant, and his iron limbs are driven by hot vapour.

But he makes his own steam, so that answer will not do. We must go farther than the steam to find the origin of his power. I will tell you where his strength comes from—IT COMES OUT OF FOOD. If you want that big fellow to work, you must feed him. Stop his food, and he will not do another stroke of labour. Give him nothing to eat, and his mighty arms will leave off their swinging, and his supple joints will grow motionless and stiff.

And what is the food that the steam-engine consumes? If we were to go round outside the engine-room of the yarn-spinning giant, we should see for ourselves what it is. Every now and then we should observe a huge mouth opened wide, and fresh supplies of nourishment shovelled into it by a sturdy attendant, and we should hear the giant roar hoarsely with satisfaction, as he swallowed morsel after morsel. The steam-engine eats black coal, and out of black coal gets its power.

Now, as it is with that yarn-spinning giant, so it is also with your own living frame, my working friend. It matters not what your work is—whether you dig and plough in the fields, or hammer upon the anvil, or weave in the loom. THE STRENGTH WITH WHICH YOU PERFORM YOUR LABOUR, COMES OUT OF THE FOOD YOU EAT; and if you are not duly fed, *your* limbs too will soon refuse to play, and *your* joints will become rigid and still.

But your living frame, considered simply as a machine,—that is, as a complicated instrument, capable of performing labour when set to work,—is very much more wonderful even than the machinery of that surprising steam-giant. You can accomplish many many times more work than he could upon the same amount of food. Suppose that he were taken off from his usual yarn-spinning occupation, and were set to lift heavy weights instead. How much food do you think we should have to supply to him, if we wanted to get him to lift a block of stone, weigh-

ing one ton, up to the height of a mile? We should have to give him 890 *pounds* of coal before we could make him finish his task. That then is what his labour would cost us. We should have to buy 890 pounds of coal for him, for every ton he lifted one mile high for us. You, however, would be capable of making as great an effort, if you were allowed only *two pounds* of food. A strong man can carry a weight of 85 pounds along a level road for seven hours at a stretch, if he does not walk more than a mile and three-quarters in an hour. But in doing this he will, of course, have to carry his own body along too. Now if his body weighed 140 pounds, and he carried the additional weight of 85 pounds upon his shoulders for this distance, and at this pace, he would actually make as much muscular effort in the time as would have been sufficient, if entirely applied to the work, to lift a ton a mile high. Powerful as the steam-engine therefore is, the human body, viewed only as a machine, is 445 times more so. In this degree nature excels art, or rather, the work of the Divine Hand is more perfect than that of human ingenuity. Give a steam-engine only the same weight of food as a living man, and it will not effect so much work by 445 times. It is true that steam-engines perform tasks which it would need *hundreds* of men to accomplish, but they only accomplish this by swallowing up *thousands upon thousands* of times as much food, as the men would, who did the same thing. My friend's hundred-horse power yarn-spinning giant has to be fed with three tons of coal every day.

But there is another remarkable difference between steam-machinery and flesh-and-blood machinery. The food of the steam-engine sets its parts moving, but has no power to keep those parts in repair. All the while those iron shafts and rods and wheels are at work, they go on rubbing and wearing themselves away. After a few months' labour those hard pieces

of metal will be quite worn up by their own movements, and a new steam-engine will have to be built to take the place of the old one. My friend knows very well that his mighty steam-engine is rubbing itself away, and that what is now worth several hundred pounds, will, by and by, come to be of no more value than old iron. He knows too that the more food he gives his steam-engine, and the more work he gets out of it, the sooner it will be worn away. Not so, however, with your body The food you take, repairs its wear and tear, besides keeping it at work. The bread and meat which you eat, first get changed into the substance of your body; actually become flesh and blood; then as flesh and blood, they perform a certain amount of useful labour. Like the iron of the steam-engine, they are worn away by their work; but that is not of very great consequence, because fresh food will make fresh flesh and blood, capable of doing fresh work. You therefore are fed, not only that you may be able to work, but also that you may be kept in repair while you are working, at least during some three-score years and ten.

The food first renews the worn body, and then it is the renewed body which is worn again by work, yet again to be renewed. How admirable is this superiority of the divinely planned mechanism, to the conception of man!

There is something however, which coal does for the steam-engine, besides setting it to work—it makes it warm. Soon after the fire has been lit in the furnace, the iron gets furiously hot, and the water in the boiler turns into scalding steam; all this heat really comes out of the coal. It was hidden away in the black mass, and only required that to be placed in the furnace, to be set light to, and to be blown upon by a draught of air, in order that it might be brought out, and made serviceable. One

pound of coal has heat enough hidden away in it, to boil 60 pints of water.

But your body too is warm. And where do you think it gets its heat from? Starve yourself for a day or two, and you will find this out. You will, under such circumstances, feel colder and colder, as well as getting weaker and weaker. A good nourishing meal on the other hand, will directly make you glow with warmth. FOOD WARMS THE BODY, as well as furnishes it with strength. There is as much heat produced in your body in a single year, as would be sufficient to turn eleven tons of ice into steam; as much in a single day, as would boil eighty pints of water.

Food then does three distinct things for the living body, and the living body must be duly fed at proper intervals, in order that these three distinct services may be rendered. IT KEEPS THE BODY WARM. IT MAINTAINS IT IN A STATE OF REPAIR, notwithstanding the wear and tear to which it is exposed while labouring. And IT GIVES IT STRENGTH AND POWER. Weigh out two pounds of bread and meat, and look at them. The two pounds make no very great shew. But eat them, and in the wonderful contrivances of your body, those two pounds of bread and meat will sustain its machinery unwasted during the exertion of a fair day's work, and in addition to this will supply heat enough to make 80 pints of water boil, and strength enough to lift a ton weight one mile!

In order that food may accomplish these important services, it is necessary that it shall be wisely chosen and no less wisely used. Many men get wasting disease, and death out of food, in the place of nourishment, warmth, and vigour. If we were to heap up wet sand in the furnace of the steam-engine, instead of coal, the fire would be smothered, and the movement of the machinery stopped. If we were to heap up gunpowder there, the whole would be blown into

fragments in a moment. Or so again, the fire of the furnace might be extinguished by smothering it with too great an abundance of coal, or it might be allowed to smoulder and die out for want. Exactly in the same way the fire and strength of the living body may be smothered by a too heavy load, or by a bad kind of food. Or it may be fanned into the explosion of destructive inflammation and fever. It is important therefore, that every one should know what right food is, and how good food requires to be managed. When I go down to see my friend's yarn-spinning steam-engine, I find that a very great amount of care is bestowed upon its feeding. Only the most suitable coal is supplied for its consumption, and the stoker, who feeds it, is selected from among his companion workmen for his judgment, and he is trained to be exceedingly careful, watching its wants, and studying its appetite, so as to give exactly what it can manage, a little and often, never allowing the furnace to be either too hungry or too much gorged.

My friend is ten times more particular about the feeding of his steam-engine, than he is about the feeding of himself, and in this respect he is pretty much like the rest of mankind. Men select and regulate, with the most cautious deliberation, what they put into the iron furnaces of their machinery; but into those delicate and sensible living furnaces which they carry about in their own bodies, they toss with reckless indifference, now, as it were, lumps of lead, and now explosive gunpowder. There is, indeed, sad need that men should be made more thoughtful than they are about feeding their bodies. As a guardian and supporter of the health, GOOD FOOD STANDS CLOSE BY THE SIDE OF FRESH AIR AND PURE WATER. Bad feeding, on the other hand, is the ally of foul air and deficiency of water, in working out dire disorder. Improper management in feeding, then, is another way in which men lay up for themselves

disease and suffering, and cause sickness to take the place of health.

Man's food consists of an almost endless variety of substances. The surface of the earth is covered with things which man can eat, and get strength out of. This is a very bountiful arrangement, made by Divine Providence, in order that the rapidly increasing multitudes of the human race may be supported. Into whatever diversity of climate or country man can go, there he finds a rich abundance of the nourishment which the continued well-being of his body requires. In the hot tropics he gathers bread-fruit from the trees, and plucks rice from the ground. In temperate lands he covers the soil with corn, and pastures beef-yielding oxen and mutton-affording sheep upon the grass. In the frozen wastes that lie near the poles, he gets whale-blubber and seal-oil from the inhabitants of the ocean. The water teems every where with fish, the air with fowl, and the solid ground is literally painted green with its productiveness. Nearly all food-substances are, however, more or less solid bodies, in order that they may be kept conveniently in store until they are immediately needed, and it is, therefore, a natural consequence of this arrangement that they have to undergo a sort of preparation before they can be put to use. The several parts of the body which have to be nourished are far more delicate than the finest hairs. Now suppose that you were set to get beef and bread into hairs, I fancy you would find yourself rather puzzled by the task. God however is not so puzzled. He pours beef and bread into fibres that are as much smaller than hairs, as hairs themselves are smaller than men six feet high and three feet round. You will be glad, no doubt, to understand how this is done.

The All-wise and Almighty Designer of life has seen fit to employ in the work an agent that is already familiar to us. This agent is that pure

water, which we have been recently contemplating, busy in its employment of carrying waste matters out of the way. God WASHES FOOD INTO THE BODY, exactly as He *washes* worn-up material out of it. The very water, indeed, which carries away the waste, has first economically carried in the food. God has laid down pipes of supply which run every where through the structures of the body, exactly as he has laid down drain-pipes. These pipes branch out to the hair, the eyes, the head, the feet, the flesh, the bones, and the skin. At the beginning of the supply-pipes there is a great pump always at work, pumping on the supply. This pump is called *the heart*. Place your hand on the left side of your chest, and you will feel how this heart is springing at its pumping work. You will be sensible that it is raising itself up at its labour, at every stroke, so determined is the exertion of its strength. The supply-pipes are termed *arteries*. One large arterial pipe comes out from the heart, and then sends out branches in all directions, very much like the water-pipe sent out from the great reservoir into all the houses of a town. The branch-pipes get smaller and smaller as they go from the main, until at last they are many times smaller than the smallest hair. The food that is washed through the branching supply-pipes, by the strokes of the heart, is called *blood*. There are about 20 pounds of blood in the body of a full-grown active man; of these 20 pounds nearly 16 are nothing else than pure water, the other 4 pounds are the finely divided food which is being hurried along by the water. This then is what I mean when I say that the food is *washed* into the body, by the agency of water. Take the finest needle you can find, and stick its point any where into your body, and you will find that blood will rush out of the hole. This will show you what great care has been taken to send supply-pipes *every where*. There is no spot, however small, into which a needle point can be

thrust without wounding a supply-pipe. When the heart pumps, red blood thus *flushes through* every portion of the living frame, repairing and warming it, and supporting it in its offices. But you will say I have not yet proved my case. Food is washed out of the heart to all parts of the body. This heart, however, is already *in* the body. There is therefore no washing of the food *into the body* here. It is already in, when it is pumped from the heart; but where does the heart get the blood from, which it pumps onwards? How can it be shown that the blood comes out of food? This is to be my next step. I am going on to explain to you that the heart gets its blood from the food which is eaten; that the blood indeed is finely divided food given up to the conveying power of water; food finally prepared for its task of nourishing the living frame. How then is the food thus prepared? how is solid food turned into liquid and easily flowing blood?

FOOD IS TURNED INTO BLOOD BY BEING DIGESTED. Men have digesting bags, more commonly known under the designation of stomachs, inside of them, into which portions of digestible substances are placed from time to time. These inside digesting bags are particularly convenient, because when a fair quantity of food is once packed away there, men may move about in pursuit of their business without having to give any further heed to the digesting work that is going on in their behoof. Before, however, food is passed down into the digesting bag, it is first ground in a powerful mill, and mixed up with liquid into a sort of paste. The mill has many pairs of very hard stones set in rows over against each other. It is called *the mouth*, and the stones are termed *teeth*. The liquid which makes the ground food into paste, is poured out from little taps laid on in the mill or mouth, and is called *the saliva*.

When the ground and moistened food has been deposited in the stomach, more liquid is poured out upon it there. This liquid is termed the "gastric" or *stomach juice*. Next it is shaken, and churned up, and turned over by the movements of the stomach-bag. After a few hours' churning, it has become so soft and pulpy from the soaking, that it is ready to advance another stage. Then a sort of sluice-gate at the end of the stomach is opened, and down the pulp goes into the bowel, there to be mixed with another liquid called *bile* or *liver juice*, and the soaking or digestion is completed. The pulp then consists of two things—a white milk-like liquid; *that* is the rich and nourishing part of the food, ground and soaked down to the utmost fineness, and mingled with some of the water which has been drunk. And a coarse solid substance, still undigested; *that* is the waste part of the food which has resisted the dissolving power of the stomach, and is on its way to be rejected as good for nothing. The white milk-like essence of the food gets sucked up, by a quantity of little holes or mouths that lie all over the lining of the bowel, as the pulp moves down this canal. Then it is carried by tubes provided for the purpose into one main channel. This channel runs upwards until it ends in the great forcing pump. Poured into the heart, it reinforces the blood which it finds there, and is sent onwards with it through the supply-pipes. This is how food becomes blood.

Very wonderful, indeed, is this dissolving power of the saliva and stomach juice! If the food were merely beaten with water into a moist pulp, and were then left in a warm place, it would soon ferment, and become putrid, and good for nothing. The digesting juices, on the other hand, so long as the stomach is healthy and strong, keep the moist pulpy food sweet in the warm stomach, and merely draw out from it a rich milky essence of nourishment, which consists, indeed, of the very strength of the food. The saliva mixes with the ground food much more readily than

pure water could, but itself has a very great affection for water, so to speak. It thus brings the ground food under the full dominion of water. The saliva, the stomach-juice, and the bile, together, are able to draw out and change into milk-essence every nutritive particle that is contained in the food, however diversified this may be. Each has its own method of operating, and each takes its own share of the dissolving labour; but the result is, that all which is needed for the service of the body is taken out from the food, and made ready to be washed along into the blood.

But there are CERTAIN DISTINCT AND DIFFERENT PRINCIPLES which the body requires should be furnished to it, out of food. You stand there very firmly on the ground, and you look jolly and substantial enough. I should think from your appearance you have been in no way stinted in the matter of supplies. I estimate, at a guess, that your substantial body would weigh, some 150 pounds, if placed in the scales. Now what do you think the *greater part* of those 150 pounds is composed of.—Bones? Not exactly, you are too soft for that.—Flesh? There seems plenty of flesh, but the flesh is not the most abundant element.—Brains? I am afraid they are less than the flesh. No. You will wonder indeed when I tell you that three-quarters of that firm and well-knit frame, are nothing else but WATER. If I were to take your body and dry it until all its water was gone, there would remain behind nothing but 37 pounds of dry mummy-substance, in the place of the original 150 pounds; 113 pounds of water would have steamed away. You will see then that water must be furnished in fair quantity, with or in the food. You have heard, I do not doubt, many horrible and sad things, which have happened when people have been kept a long time without water. Thanks to the bounty of Providence, this privation is, however, one that very rarely occurs.

But now, supposing that we have steamed away

the 113 pounds of water, and that there are left behind 37 pounds of dry substance, what does that substance consist of? It still contains several distinct things, which have had entirely distinct offices to perform in the living frame.

First, you know, there is that FLESH, which makes so comely a show. *Now*, we shall be able to find out, how much there really is of flesh. Of dry flesh-substance, including a little skin and jelly, there are 17 pounds, and that is the working part of the frame. It is by its means the ton-weight can be lifted one mile high in a single day, and that all the moving and acting, of whatever kind, are effected. Remember, then, that the acting part of the living body is *flesh-substance*, and that of that flesh-substance there are not more than 17 pounds in a full-grown man.

While your body is alive, there is a hard frame-work inside of it, upon which the soft flesh is fixed, in order that it may be kept in a convenient and durable form, and around which the water is packed in a countless myriad of chambers, and vessels, and porous fibres. The hard internal frame-work is composed of what are called *bones*. In the dried mummy, left when the moisture is all gone from the body, there are rather more than nine pounds of this mineral bone-substance. But there are also nearly three-quarters of a pound of other MINERAL SUBSTANCES, which were scattered about in various situations, and which were employed for various purposes. There is salt which was in the saliva, in the gristle, and in the blood. There is flint which was in the hair. There is iron which was in the blood. There is potash which was mixed with the flesh-substance. There are lime and phosphorus in the hard millstones,—the teeth; and there is phosphorus, which was in the nerves and the brain. These mineral substances with the bone-earth, which is principally a kind of lime, form together the ash or dust which is returned to the ground after the body has decayed. It is the flesh-substance which

flies away to become poison-vapour in the air. (*See p.* 13, *2nd ed. of* "*Worth of Fresh Air.*")

But besides water to do transporting work, flesh-substance to do active mechanical or moving work, and mineral substance to do passive mechanical or supporting work, there is yet another kind of material within the body. You have as much as six pounds of FAT, scattered about or packed away amid the 17 pounds of dry flesh.—What can that be for? What use do you think you make of your fat? You have, I dare say, a sort of comfortable sense that it keeps you warm. You know that some of your lean neighbours cast envious eyes towards you in severe winter weather, and have chattering teeth and goose's skins, when you are quite free from such tokens of chilliness. But you will nevertheless be surprised when I tell you what a really fiery piece of business this warming by fat is. Your fat is a store of fuel, which you are going to burn to heat your body, exactly as you burn coal in the grate to heat your room in the winter. It is oil laid by, to be consumed gradually, as a sort of liquid coal, in the furnace of the living machine. Of this we shall, however, have to say more, by itself, by and by. For the present merely bear in mind that fat is the fuel-substance which furnishes warmth to the body. It also combines with the phosphorus and with water to make up the *nerve-substance* and the *brain-substance*, which do the feeling and thinking work. These too, however, will have to be spoken of hereafter by themselves.

Let us now then take stock of the stores we have on hand, within the skin of a living body of 150 pounds weight. We have

WATER for transport and moistening,	113	pounds
FLESH-SUBSTANCE for movement .	17	„
MINERAL-SUBSTANCE for support .	10	„
FUEL-SUBSTANCE for warming .	6	„
If we add these together, our sum is	146	„

We still want four pounds more to make up our 150. Where are we to get these? Why we have got them already. Have we not already learned that there are four pounds of freshly digested food being washed along through the supply-pipes of the body? We have only to add to the previous 146 pounds

Dry substance of THE BLOOD . 4 „

and our tally is completed to 150 „

As the blood is the direct source of supply to all the structures of the body, the material which is being poured out through the supply-pipes,—it follows that those four pounds must contain within themselves flesh-substance, mineral ash, and fuel. There are in 20 pounds of blood, 16 pounds of water to wash along the more substantial part through the supply-pipes, three pounds ten ounces of flesh-substance, four ounces of fuel, and about 2 ounces of mineral matter; salt, phosphorus, lime, and the rest.

The blood is speedily exhausted of its richness, because it gives up its several ingredients to the different parts of the living frame to confer warmth, repair, and active strength upon them. The warmth is procured by burning the fat; you will easily understand that; you know that an oil lamp gets very hot whilst its flame is kept up. The repair is effected by the plastering of new matter out of the blood, upon all the different structures as they wear away. Each structure selects for itself out of the blood what it wants, and arranges what it takes in due order. But you would now like to know how active strength is supplied by the blood. It will not be possible *just now* to tell you concerning this, all which might be, and indeed ought to be told, because we have other and more practical things to bend our attention to. But this much you will easily comprehend. The power COMES OUT OF THAT VERY CHANGE of substance, which we call wear. The "wear" is actually the turning of

the substance into power. Upon another occasion this may be made more plain.

The blood supplies what every part of the living body requires, and of course itself loses what it gives out. But the impoverished blood is in its turn renewed and refreshed by occasional supplies of food. Here then we at last arrive at the pith of the subject under consideration. The food supplies the blood, and the blood supplies the body. Therefore EFFICIENT AND GOOD FOOD MUST HAVE IN IT ALL THE SEVERAL PRINCIPLES REQUIRED BY THE BODY—FLESH, FUEL, AND MINERAL. No kind of food is sufficient to maintain vigorous life and health, which does not contain a due amount of every one of these.

When the young animal comes first into the world, its powers of digestion are weak, and it is fed for some time entirely upon a food already digested for it by the parent. This parent-prepared food of the young animal, which is called MILK, of course, contains within itself all the several matters which have been spoken of above, as essential for the supply of the body. Thus when the dairy-maid curdles milk with rennet, and draws off the whey, afterwards pressing and drying the curdled part, the curd at length comes out of the press as *cheese*. That is the flesh-substance, which was contained in the milk. When the dairy-maid turns and twists cream about in the churn, until *butter* collects in the midst of it—that butter is the fuel-substance, or fat, which was contained in the milk. The whey which is taken off from the cheese, or butter, is principally *water;* but if this water were steamed away by heat, there would remain behind a small quantity of *fixed ash*, which could not escape.—That is the mineral-substance. Here then we have what we may term a specimen of Nature's pattern-food. The relative proportion in which the several food-principles are contained in milk, becomes a most excellent guide to the way in which they should be

used in the more artificial feeding of later life. Take then as

A Receipt for Pattern Food,

the following, which expresses the relative quantities of cheese, butter, and ash, in milk.

One ounce of Flesh-substance,
Two ounces of Fuel-substance, and
Ninety grains of Mineral-substance,
To twenty-two ounces of Water.

The most extensively and generally used of all the articles of human diet is **Bread.** It has been fittingly called THE STAFF OF LIFE. Now it is a curious and remarkable fact that bread contains in itself just the same principles as milk; but it is of course drier, and has proportionally more fuel and less flesh-making substance. The flour, from which it is made, is composed of a stiff sticky *paste*, and a fine white *powder*. well mixed up together. The paste is *flesh-substance;* it is nearly the same thing, indeed, as the flesh of the body, in all excepting arrangement. The powder is *starch:* just such as is used in the work of the laundry. Now starch is merely fat in its first stage of preparation. It is vegetable fat in so firm and dense a condition that it can be stored away in the husks of grain, or even in bags made by man, and kept there unspoiled until it is wanted. When starch is about to be used as fuel in the living frame, it is first turned into *sugar* and *gum*, and then into perfected fat, or oil. Sugar and gum are starch in the process of turning to fat. They are the store-fuel making ready for burning. Even seeds, when they begin to grow, become sweet, because their starch is then converted into sugar. Remember carefully then, that *starch*, *gum*, and *sugar*, are all *fuel-substance*, in different stages of preparation for burning.

Now if you were going TO MAKE FLOUR INTO BREAD, how would you proceed? First you would place seven pounds, we will say, of flour in a pan. You would

hollow out a hole in the middle, and pour in half a quarter of a pint of yeast, mixed up with a pint of warm water. You would stir this up with a wooden spoon, until it formed a thickish paste. The paste is the sticky flesh-substance of the flour, moistened with water, and holding the starch fast in its grasp. After the mixture has stood an hour and a quarter in a warm place, you would next add two teaspoonfuls of salt, and knead the whole well up together with as much more warm water as is sufficient to make the compound into a stiffish dough. If you intended to make good bread, you would spare no labour in this part of the process. You would knead it, and work it, and knead it again, until your arms and hands ached with the work. You would do this in order that the yeast and the water might be forced into contact with every portion of the dough. If any were left insufficiently moistened, and unyeasted, that portion would not be changed into good bread. Having finished the kneading, you would leave the dough standing another hour and a half, covered lightly over by a cloth. During this time it would rise, its inside becoming more and more spongy. The reason of this is, that the yeast, moisture, and warmth, have made some of the starch turn into sugar and gum; and as it has been doing so, a sort of fixed air has burst out from the starch, and forced the sticky paste into bubbles. After the hour and a half of standing, you would cut the dough into two or three pieces, and you would place these upon a tin in a well-heated oven, having its door thoroughly closed, and bake them for an hour and forty minutes. The heat of the oven would then soon destroy the activity of the yeast, and fix the dough, so that it could not froth and bubble any longer. In due time you would draw forth the dough from the oven, and find it baked into loaves.

When bread is well made, by the skilful employment of these measures, *the rising of the dough* marks the change of the store-starch into sugar and gum through

fermentation. This is really *a beginning of the work of digestion*, and, in so far, a lightening of the task the stomach will have to perform. It is very important, however, that this change shall be carried to a proper point, and then stopped. Bread should be neither *too heavy* nor *too light*. If the former, it will not be easy enough of digestion; if the latter, some portion of the virtue will have been unnecessarily wasted. Bread contains a great deal of water, and so to a certain extent is both food and drink. One hundred pounds of flour suck in 50 pounds of water, when made into dough. This is all retained in the bread, however dry it may seem to get. If stale bread be heated for half an hour in a *close* tin case, nearly to the temperature of boiling water, and then be taken out, it will be found to be restored to the condition of new bread. In wheaten bread, to every 11 ounces of water, there are 12 ounces of mingled starch, sugar, and gum, and one ounce of flesh-substance.

Brown Bread is more rich in flesh-making substance, bulk for bulk, than fine wheaten bread, because the outer husk of the grain, which constitutes the bran, itself contains a large quantity of that material. When the dough is formed from *whole meal*, instead of from fine flour, the cost of the bread is considerably diminished, at the same time that its bulk and weight are, even in a greater degree, increased. The addition of a little milk to the dough has the effect of still further raising the nourishing power of the bread, besides causing it to keep fresh longer; a pint of milk adds one pound to the weight of a loaf. A quarter of a pound of mashed potatoes, mixed in with every four pounds of flour or meal, also improves the keeping quality.

Rye-bread is not so pleasant in flavour as wheaten bread, but it is about equal to it in nourishment, and can be kept for months without being spoiled, which wheaten bread cannot. **Oatmeal** cannot be fermented like wheaten meal, but it is

nearly as rich again in flesh-making substance. It is its very richness in this gluey material, which renders it incapable of being made into light bread. Scotch men and women consume a great quantity of oatmeal as porridge and unfermented cake, and get both very fat and strong upon their food. This article of diet, has indeed, the recommendation of being very appropriate for young people, who are growing rapidly, and is fortunately, at the same time, *comparatively* cheap.

Milk, the pattern food, contains, it will be remembered, twice as much fuel as flesh-substance in it. But *bread* contains eight times as much fuel as flesh-making substance. Consequently a great deal more bread has to be consumed to get the same amount of nourishment out of it, and then very much more fuel has been taken into the frame than is required, which has to be got rid of as waste. Hence it is both economical and wise to add to a bread-diet, whenever this can be done, some other kind of food, which consists principally of flesh-substance. *Butter* and *fat* are also advantageously taken with it, because the fuel contained within bread is a great deal of it still only store-fuel, and unfit to undergo immediate burning.

The best addition that can be made to bread-diet is obviously that flesh-substance which is already in a very perfect and condensed state—namely, **Meat.** *Lean beef* contains four times as much flesh-substance, weight for weight, as the most nutritious bread, and it is entirely destitute of the store-fuel, starch, of which bread has such a superabundance. Meat therefore is manifestly the natural ally of bread in the formation of a very nutritious diet. All wild animals have very little fat mixed with their flesh. It is, however, the great object of the grazing farmer to make his mutton and beef as fat as he can. Meat, as it is sent to market, commonly has one-third of its substance fat alone. Such meat approaches more

nearly to the nature of bread, and indeed may almost be used instead of it, so far as its influence on the support and warming of the frame is concerned.

It is even more important how MEAT IS COOKED, than it is how bread is made. A very great deal of waste and loss are easily produced by unskilful management in this particular. Meat is cooked to make it *easier of digestion;*—indeed by the process digestion is begun by art before the food is introduced into the stomach. A certain quantity of the meat is necessarily lost by cooking. A pound of beef, for instance, is reduced 4 ounces in boiling, and a pound of mutton 3½ ounces. This loss is, however, in well-managed cooking, principally water and fat; with badly-managed cooking nearly all the nutritious part of the meat,—its flesh-substance,—*may be wasted* too.

A pound of meat loses an ounce more in baking, and an ounce and a half more in roasting, than in boiling. Boiling is therefore the most economical method of the three. Meat should always be *put first into boiling-hot water*, because by this means the pores of the surface are at once closed fast, and the juices shut in. When meat is placed in cold water, and kept gently simmering, the juices all ooze out into the water. The latter plan is the best mode of proceeding, when the object is to *make nutritious soup* or broth. But when it is desired to *keep the meat itself nutritious*, the employment of the greater heat at first is the more judicious course. So likewise in roasting, the meat should be *placed at once close before a clear fierce fire*, in order that by the curdling power of the heat a great coat may be formed upon it, through which the juices cannot flow; then it should be removed further away, in order that the inside may go on cooking more gradually by the heat of the imprisoned juices. When meat is placed before a dull slow fire at the first, the principal part of the gravy runs out, before the surface is hardened and closed.

Meat is the most valuable addition which can be made to bread, but unfortunately it is not a cheap addition. It requires a certain command of means always to be able to place a joint on the table, and this cannot be constantly reckoned upon by working men, who have families to provide for. Any kind of hard and inferior meat which may be purchased comparatively cheaply, as, for instance, an ox cheek or a sheep's head, may however be made to yield a richly nutritious and palatable meal. It should first be rubbed with a little salt and pepper, and then be put into a saucepan, with from one to four quarts of cold water, according to its size. This is then to be kept simmering upon the hob from one to three hours (according to size.) The fat being skimmed off will be serviceable for making puddings. A little celery or onion may be put in during the simmering. The meat will prove deliciously tender, and there will be in addition, from one to three quarts of excellent nutritious soup to be eaten with bread. Even bones, of which a fifth part is nutritious substance, may be made to furnish a meal for hungry stomachs, by this simple contrivance. Break small six pounds of bones, boil them in eight quarts of water for three hours, with three tablespoonfuls of salt and a bunch of thyme or other savoury herbs. Then skim off the fat and remove the bones. Put into another saucepan or pan, the fat, two sliced onions, a pound of carrots, turnips, or celery, and two teaspoonfuls of sugar. Set the whole on the fire, and stir for 15 minutes, add half a pound of oatmeal and mix this well in, next pour over the broth from the bones, add a pound of rice, and boil again until this is soft. By this management you may provide a very nutritious meal at a much lower cost, than a meal of bread.

THE GREAT OBJECT OF COOKING is the reduction of the several principles of the food into such a soluble state as will prepare them to be easily acted upon by the digestive powers of the stomach, at the same time

that none of their virtue is allowed to be lost. Cooking is, indeed, properly the first stage of digestion; it is an art which the intelligence of man has taught him, in order that food may be made to go as far as possible in furnishing nourishment to living frames. *By good cooking, hosts of things are converted into excellent nourishment*, which would be entirely unmanageable by the stomach without such assistance. The art of cookery ought, however, never to be carried further than this. It should not strive to make men eat more than their bodies want, by furnishing the temptation of delicious flavours. Every meal should have brought together into it, a due admixture of the several distinct principles, which have been named as the great requirements of the body; but there should be no greater degree of mixture, than is just sufficient to ensure this. There should be *flesh-substance* in a half-dissolving, or tender state. There should be a still larger amount of *fuel-substance*, partly fat, and partly such as is in a condition capable of being converted into fat in the stomach and blood. *Mineral substance* enough is sure to be present in every kind of food; and *water*, of course, can be added in any amount, as drink.

There are several common methods of intermingling different kinds of food, to form a meal, which seem to have been adopted almost unconsciously, but which nevertheless are right in principle. Thus MEAT and BUTTER, are, as we have seen, generally eaten with over-starched BREAD. RICE, and ARROWROOT are nearly pure starch, and are commonly mixed with MILK, and with MILK and EGGS, which are both rich in flesh-substance. WHITE OF EGG is entirely composed of flesh-substance and water; it is added to puddings to make them more gluey. EGGS are eaten with FAT BACON because the white is entirely destitute of fat. YOLK OF EGG consists of flesh-substance and oil. PORK is taken with PEAS and BEANS, because they possess a great abundance of

nutritious or flesh-making substance, while the pork itself has more fat and less nutrition than any other kind of meat.

The Potatoe contains twelve times as much starch as flesh-making substance; it is thus one-half less nutritious than bread. On this account it is very generally made the companion of meat. A very excellent nutritious dish may be formed by placing about two pounds of neck of mutton in a pan, with eight large potatoes and four onions sliced, a tea-spoonful and a half of pepper, three tea-spoonfuls of salt, and enough water to cover the whole; the pan is to be set in a slow oven for two hours, and its contents are to be all stirred up together when about to be served. When the potatoe is cooked, a portion of its store-starch is changed into sugar and gum; in this conditon it is very similar to bread which has lost a portion of its flesh-making substance. It requires some little attention and skill to prepare the potatoe properly for the table. New potatoes cook best when put first into water nearly boiling; old potatoes more generally when first put into cold water. They should be boiled in their skins, until these begin to crack, a little salt having been added to the water. The water extracts a soluble matter contained in the root, which is not altogether wholesome; it should therefore be now thrown off, and the potatoes be left for a time standing dry near the fire, covered with a cloth. The more waxy the potatoe, the more quick should be the boiling. Watery potatoes are also greatly improved if a piece of lime, about the size of a nut, be placed in the water. It serves to extract from the tubers some of the substance which keeps them in a waxy state.

It is of the very highest importance that any one who is likely ever to have the care of a household, whether large or small, should so far UNDERSTAND THE OBJECTS OF COOKING AND THE PRINCIPLES upon

which the process requires to be performed, as to be able to see that food is properly and economically prepared. If your means be small, remember that such knowledge can make that portion of your money which is devoted to the purchase of food, go as far again, and yield twice as much harmless gratification as it would otherwise do; if you have an abundance of means, then the knowledge may be made serviceable in providing *only* such food as is suitable to the maintenance of health and strength, and the avoidance of disease. If you have a family of children to bring up, and have plenty of money to do it with, you are perfectly right to furnish them with every accomplishment, and every advantage learning confers; but never forget that no woman is ever less accomplished because she knows something about homely household concerns,—cooking among them,—as well as a great deal concerning other things.

Fish very nearly resembles lean meat in its character; it is hence a very good companion to potatoes and bread. In a general way it requires to be eaten with butter or oil on account of its deficiency in this ingredient. *Skate* has 32 times as much flesh-substance in it, as fat. *Haddock* and *herring* have eleven times as much. The *salmon* and the *eel* are the only kinds of fish which are in themselves of a very oily nature. The salmon has a little more than three times as much flesh-substance as oil, and the eel has actually more oil than flesh-substance. Fish is rather more easy of digestion than meat, and when judiciously combined with bread, potatoes, and fatty substances, constitutes an exceedingly wholesome food. The waters of the ocean are so bounteously replenished with this kind of nourishment, that they are capable of furnishing a very much more abundant supply than they have yet been made to do. As if for the very purpose of pointing out that one of the objects for which fishes have been placed in the water, is the

furnishing nutrition for the human race, some of the kinds that ordinarily dwell in the deep ocean are driven by their instincts, at certain seasons of the year, to the shoal waters surrounding the land, where they are quite within the reach of man.

Fresh Vegetables contain a very large proportion of water, but there is in their structure also a considerable amount of flesh-making substance, besides starch and sugar. The *turnip* and the *carrot* are very nutritious, but deficient in fuel-substance upon the whole, so that they form good additions to fat meat like bacon and pork. The same may be said of *cabbages* and *cauliflowers*, which exceed even carrots and turnips in their nutritious power. Boiled cabbage and potatoes, beaten together with a little pork fat, salt and pepper, form a compound which approaches very nearly to the nature of bread, and which indeed is as nutritious as the richest Scotch oatmeal. One third part of *dried* cabbage consists of flesh-making substance. The *onion* is very rich in flesh-substance, and therefore forms a valuable addition to dishes containing much store starch and fat.

Fresh vegetables require, in most instances, to be boiled before they are eaten, because their juices contain disagreeable flavours, and in some instances unwholesome ingredients, which are, however, entirely removed by the influence of boiling water. **Ripe Fruits,** on the other hand, are vegetable substances, which have been thoroughly cooked by the maturing powers of the sun, and which have also been endowed, by the hand of Nature, with the most delicious flavours, in order to tempt man to partake of them in due season; they are, so to speak, *bouquets provided for the palate.* Ripe fruits consist principally of water holding in solution sugar and small quantities of flavouring oils. But they also contain in their juices peculiar acids, which exert wholesome influences over the blood in hot weather. They merely require to be

partaken of in moderation, and when thoroughly ripe. If not perfectly ripe, they should invariably be cooked, before they are eaten, in order that the process of sugar-making going on within their chambers, may be assisted and hastened. Almost every case in which fruit has seemed to be unwholesome, has been due either to its having been taken when unripe, or to its having been consumed in excessive quantity. The danger of its being eaten in undue amount is very great on account of the agreeable and tempting flavours with which its juices are endowed.

We have now to suppose that a wholesome but plain meal of good bread, and well-cooked meat and vegetables, selected and prepared according to the principles which have been explained, is set before you, and that you are about to apply these to their proper office of nourishing your body; how will you proceed? You will introduce the food, morsel after morsel, into your digesting bag. Now while you are doing this, take care to bear in mind what you are about. You are swallowing substances that will need to be brought most thoroughly within the power of the saliva and stomach-juices, in order that these may perform their wondrous dissolving work. DO NOT, THEN, FORGET THE MILL. Those ivory teeth have not been planted so firmly in your jaws for no purpose. They are meant for work, and for hard work too. Food is not intended to be bolted, but to be ground. Do not furnish one single morsel with its pass until it has been reduced to the finest pulp; then the saliva will get to every grain of the store-starch, and change it into serviceable sugar and gum, and the stomach-juice and liver-juice will get to every fibre of the flesh-substance, and reduce it to milk-like liquid, capable of entering the channels of the supply-pipes. If you bolt, instead of thoroughly grinding your food in the mill, be assured that the heavy lumps will prove too much for your digesting bag, however strong that

may be. The greater portion, after having oppressed the offended stomach with their unmanageable load, will cause griping and all sorts of annoyance, and will at last be dismissed from it, undissolved and without having furnished any nourishment.

Another important thing is to get enough food if you can; the body requires to be sufficiently nourished. On the other hand, however, be very careful that you do not attempt to get MORE THAN ENOUGH. If you do try to accomplish this you will fail in the attempt, and have to pay a heavy penalty, for your failure. Thousands upon thousands of people do try, and do fail, and then pay such penalties. You have heard it said that enough is as good as a feast. This is only a half truth, it does not go sufficiently far. ENOUGH IS FAR BETTER THAN A FEAST, *if "a feast," means more than enough.* There is more danger really in over-feeding, than in under-feeding. Countless numbers of underfed countrymen work through a long life in the fields, in happiness and contentment, and arrive at old age, almost without an hour of illness. But every overfed man sooner or later has to go to bed, and send for the doctor to help him to get rid either of rheumatism, or fever, or gout, or inflammation, which are forms of disorder into which superfluous food often changes itself. The life of labour and short commons, has upon the whole a much larger share of happiness, than the life of laziness and luxury.

But what is ENOUGH? That in regard to the feeding is a very serious question. At the first glance, too, it seems to be one which is not altogether easy to answer, because some men require more food than others, just as some steam engines consume more coal than others, to keep themselves moving; and just as some lamps take more oil than others, to keep up their flames. It is, nevertheless, a question which may be very easily answered. Every man who eats his meal slowly and deliberately,—*not forgetting the mill,*—HAS

HAD ENOUGH WHEN HIS APPETITE IS SATISFIED. Appetite really is Nature's own monitor. It is ruled, not by the state of the stomach, but by *the condition of the blood.* When so much blood has been taken from the supply-pipes of your body, by the working parts, that those pipes begin to be comparatively empty, their emptiness makes itself felt in your frame as hunger. Obedient to the hint, you find up food and eat. But while you are eating, what happens? First you seize the food with all the keen relish of a hungry man. Then as you eat on, the relish becomes less and less, and if your meal be a simple one, when you have had enough, all relish has disappeared, and the very things that tasted so deliciously at first, are insipid, so that you find no further enjoyment in the act of grinding and swallowing them. Go on eating after this, and the insipidity will be transformed into disgust; and if notwithstanding this you still persevere in forcing food into your stomach, that sensible organ will at last rebel against the tyranny, and return the whole which it has received upon your hands. Then it will be some little time before the stomach gets over the insult. Consequently the blood remains all this while in the impoverished state, and the result of the over-gorge is that the *body itself* is actually *starved*, instead of being *feasted.* If when your natural appetite for food is satisfied, and your enjoyment and relish of it have ceased, you have rich and high flavoured dishes set before you, the high-flavours will then still prove agreeable to the palate, and act upon it as a sort of excitement, and the natural appetite will have its work superseded by a false and artificial one, and you will go on eating under this temptation, until your stomach is over-crammed. All the so-called luxuries of cooking are merely devices *to make men eat more, who have already eaten enough.*

But when men who have already eaten enough, eat

more, what must happen? one of two things—either the stomach, being particularly vigorous, *will get through an extra amount of work;* then there will be more blood sent into the supply-pipes than the body requires, and the frame will be every where stuffed and oppressed with the load, to the danger of inflammations, rheumatism, and other-like disorders being set up: or the stomach *will be unequal to the task of doing extra work;* then the food which cannot be digested will decay and putrefy in the stomach and bowels, producing there all sorts of poison-vapours and disagreeable products, which will lead to stomach and bowel disorders, until nature, or the doctor, finds some way for their removal, or until something worse takes place.

Thrice favoured is he who is not daily exposed to the dangers of a luxurious table. Money, after all, is not *in itself* a blessing. It is only a blessing when it is possessed by those who know how to employ it for good purposes. In the hands of men who do not know how to employ it so, it often proves to be a curse.

Food, which is already in a state of commencing putrefaction or decay, is always dangerous for this reason; it forms poison-vapours and injurious products in the stomach, before its digestion can be completed in the natural way. If, however, meat about to be used is at any time found to be tainted, it will be at once rendered wholesome, if the most tainted part be cut away, the cut part being rubbed with a piece of charcoal, and the joint be then well boiled in water, in which a piece of charcoal has been placed.

Here then, in conclusion, are two or three **Golden Rules for the management of your feeding.**

NEVER HAVE ANY BUT THE PLAINEST AND SIMPLEST FOOD placed before you when you are hungry, whether you be rich or whether you be poor.

EAT OF IT UNTIL YOU FIND THE RELISH FOR IT DISAPPEARING.

THERE STOP, and on no consideration swallow another mouthful, UNTIL THE SENSE OF APPETITE AND RELISH COMES BACK to you.

By these means you will make sure that you always have nourishment enough, and that you never commit the folly of attempting to get too much. Keep ever present in your mind that it is *not food in the stomach*, BUT FOOD IN THE BLOOD, which confers strength, and that it is the natural appetite and relish for food, which tells you when the blood needs a fresh supply, and when the stomach is ready to deal with it in the blood's behoof. It is in order that you may not be deprived of the service of this natural indication that it is so necessary you should eat nothing but plain and simple food; bread, ripe fruit, and well-cooked meat, and vegetables, without spices and artificial flavours, such as persons who are called good cooks delight in. On account of the general occupations of life, and for other reasons, it proves to be convenient that meals shall be taken at regulated and stated times. Three meals a day, separated from each other by an interval of five or six hours, is a very good arrangement, because these intervals give the stomach a couple of hours' repose after each act of exertion.

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